Questions generated by Barker papers

- **Allopolyploidy vs. autopolyploidy**

Is it simple doubling (i.e., failed meiosis) or hybridization that leads to polyploidy more often? Does one path lead to more diversification at the specific or generic level?

Would it be biologically relevant to distinguish between auto- and allopolyploidy speciation in the 2011 paper, especially considering extinction rates?

The papers do not differentiate allopolyploids from autopolyploids, do they have similar or different extinction and diversification rates? Would it be possible to separate the different polyploidy origins in studies with these large datasets?

- **Polyploidy and latitudinal gradients**

I would like to see how the speciation/extinction rates of diploids vs polyploids varies spatially, considering the trend towards increased polyploidization in the upper latitudes. If the author's sampling was taxonomically diverse but not spatially varied, could this be introducing a bias into the analysis?

- **Sampling bias?**

Mayrose et al. write that they corroborate that genome doubling is associated with increased net diversification rates. It would be interesting to see if the chromosome counts are lower for families that are monospecific or have low diversity (e.g. Dirachmaceae, Grubbiaceae, Cercidiphyllaceae) as another way of testing that hypothesis. We would expect the species contained within the above families to have lower chromosome counts then those of speciose genera. I did not see these or other families with low diversity in the supplemental materials.

Could the results about the frequency of the polyploid speciation and evolution of the genera be affected by the way how the authors chose the genera and phylogenies to be evaluated? For example the groups chosen in Araceae accumulate more than 80 % of the polyploid cases in the family. In the Bromeliaceae they included genera that have been shown not to be monophyletic (e.g., *Tillandsia* and *Vriesea*).

The authors of the 2009 paper suggest that their estimates of polyploid speciation frequency may be on the conservative end. One reason they offer is that these estimates didn't take into account "intraspecific polyploid cytotypes, which may often represent cryptic biological species." (p.13877) I'm wondering how you COULD include these organisms. Also, how conservative are these estimates - how much higher would these rates be if you included the aforementioned organisms in an analysis? What if you used a different definition of species and speciation?

The authors states that polyploids are most likely to represent an evolutionary dead end. Due the nature of the production of a polyploid (that implies immediate reproductive isolation from it's parental population), Could this evolutionary dead end be more related with the fact that the subsequent species lack enough variability to create new lines due it's formation from very few individuals?

In the Woods et al. paper, the authors mention two concerns 1) "results may be biased because of uncertainty in phylogenetic trees analyzed (p 13875) and 2) aneuploidy can make patterns of chromosomal evolution more complex, and thus, the tracking of ploidy state transitions can become subjective (p13876)." Do you think the authors fully addressed these concerns?

Would obtaining data sets from different journals and /or different genera produce similar results?

- **Polyploidy and rates of diversification**

Why do you think genera with lower chromosomal numbers tend to have higher infra generic polyploid incidence?

In the Mayrose et al. paper, how can their finding that polyploidization events were disproportionately represented on the tips of the tree, suggest that newly formed polyploid lineages generally fail to persist? and doesn't this contradicts the idea that most plant species have experienced at least one genome doubling during their life history?

It is interesting that while polyploids often exhibit heterosis, this does not contribute to an increase in the diversification rate. Beginning this paper, I had assumed that polyploidy would increase diversification due to the increased vigor of the polyploids relative to non-polyploids. Perhaps this is related to increased reproductive isolation following polyploidization or maybe the pervasive nature of polyploidy and is thus not necessarily an evolutionary advantage as most land plants are polyploid.

Beyond heterosis, what are the advantages of polyploidy since polyploidy apparently doesn't lead to any increases in diversity? Is it simply a case of become polypoloid or get shaded out by a heteroic polyploid? As it can also lead to sterility, do the rates of successful, fertile polyploidy outnumber failed, sterile polyploids?

I would like more background information on the Binary state speciation and extinction model (BiSSE).